

**CHRONOLOGICAL AGE VERSUS MENTAL HEALTH DEVELOPMENT IN
UNINTENTIONAL INJURY OCCURRENCE TO CHILDREN IN CHILD CARE
CENTERS**

by

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Abstract

The purpose of this descriptive-exploratory longitudinal study was to investigate the role of developmental factors and the ecological context in the occurrence of unintentional injuries to children that occurred in child care centers (CCCs) ages 15 through 36 months old. Ecological Theory was used as the theoretical rationale for this study. Reported unintentional injuries to children ages 15, 24, and 36 months were evaluated in relationship to characteristics of unintentional injury, and the difference in developmental and chronological age. Chi-square analysis was used to explore the relationship between the difference in developmental and chronological age, and reported unintentional injury occurrence to children while at child care centers. Reported education and child care cohort size for child care workers associated with children with reported unintentional injury occurrence was descriptively evaluated. The study was a secondary analysis of a national data set from the Study of Early Child Care and Youth Development (SECCYD).

The focal population of this secondary analysis was a total of 1,313 SECCYD children whose parent or guardian reported the occurrence or lack of occurrence of an unintentional injury in a child care setting. 183 children were reported to have an unintentional injury occurrence during the specified time period of 15, 24, and 36 months of age. Eight children were reported to have an unintentional injury occurrence at a child

care center during the specified time period of 15, 24, and 36 months of age.

Additionally, reported unintentional injury occurrence occurring at the ages of 15, 24 and 36 months of age were specifically evaluated for descriptive components and the relationship of unintentional injury, mental health development and ecological context. The variable of mental health development was operationalized using the *Bayley Scales of Infant and Toddler Development (Mental Development Index)*. There were a low number of reported unintentional injuries in the SECCYD population in general and even less specifically occurring in the child care center setting. Statistical analysis revealed no significant association between chronological age and mental development age in relationship to unintentional injury occurrence. Descriptive analysis of the child care center workers education and knowledge of development identified components of the ecological context.

The findings suggest that further understanding of development and the ecological context of unintentional injuries to children in child care settings is needed when developing and promoting injury prevention strategies. Numerous methodological issues with this dissertation study are discussed. Future studies should investigate the specific role development plays on unintentional injury occurrence to children as it relates to the ecological context of the setting by exploration of the relationship between identified components of development and the ecological context of unintentional injury occurrence in children.

CHAPTER 1

Introduction

The general format of this dissertation is a five chapter option to detail the research completed. Chapter one is designed as the overview of the dissertation research including purpose of the study, significance of the study, review of the literature, theoretical rationale, including conceptual definitions of variables, and statement of the problem. Chapter two is a presentation of the methodology used to complete this dissertation study. Chapter three is a presentation of findings. Chapter four provides the discussion of findings including conclusions and scope and limitations of this dissertation study. Chapter five is a summary of the study including recommendations for further study.

Statement of Purpose

The purpose of this descriptive-exploratory longitudinal study was to investigate the role of developmental factors and the ecological context in the occurrence of unintentional injuries to children ages 15 through 36 months old that occurred in child care centers (CCCs). The study was a secondary analysis of a national data set from the Study of Early Child Care and Youth Development (SECCYD) (<http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/22361>, 2013).

The specific aims of this research were: 1) to describe unintentional injuries to children ages 15-36 months old in CCCs based on two waves of data from a national data

set; 2) to examine the association between measures of development and the occurrence of unintentional injuries to children ages 15-36 months old in CCCs; and 3) to describe the ecological context of unintentional injury occurrence to children ages 15-36 months old.

These aims are relevant because large numbers of American children spend time in child care settings where they are at potential risk of unintentional injury occurrence (Alkon, A., Ragland, D.R., Tschann, J.M., Genervro, J.L., Kaiser, P., & Boyce W.T. (2000). Further, the large numbers of children who have the potential for unintentional injury make investigation of this specific child care issue important due to the potential economic and social costs in terms of lost work hours of parents, associated health care costs, and loss of potential life years. Also, one of the goals of Healthy People 2020 is, “Prevent unintentional injuries and violence and reduce their consequences” (U.S. Department of Health and Human Services, 2012, Injury and Violence Prevention Goal). Improving the understanding of the variables involved in unintentional injuries which can happen to children can lead to improved understanding and development of unintentional injury prevention activities (NAPNAP Position Statement, 2008; Tanz, 2008).

Background and Significance

Child care for American children is, and will continue to be, an important topic in maternal-child health programs as we move into the twenty-first century. In 2011, 61% (12.5 million) of U.S. children under the age of five years were in some form of regular child care (Laughlin, 2011). With such large numbers of American children spending time in child care settings, there is a need to address the issue of the provision of safe, quality child care to these children. The issue of unintentional injuries to children in

child care centers (CCCs) is of particular interest. Currently, there are no available statistics on the actual number of children unintentionally injured in U.S. CCCs.

However, according to the Consumer Product Safety Commission, in 1997 approximately 31,000 children 4 years old and younger were treated in U.S. hospital emergency rooms for injuries (of all types) that occurred at child care/school settings

(<http://www.inciid.org/printpage.php?cat=parentingafter&id=550>, 2013). Further, the large numbers of children in daily attendance at CCCs who have the potential for injury makes investigation of this specific child care issue important due to the potential economic and social costs in terms of lost work hours of parents, associated health care costs, and loss of potential life years.

In the United States, the leading cause of death for children 1-19 years of age is unintentional injury (CDC, 2013). Injuries account for 43% of mortality for children aged 1 through 4 years and result in four times the number of deaths due to birth defects (CDC, 2013). Sixty-seven percent of deaths by injury in the United States are classified as *unintentional*. Unintentional injuries are a type of injury that occurs without purposeful intent (CDC, 2013). The Healthy People 2012 objectives call for prevention activities that focus on the type of injury such as drowning, fall, fire or burn, firearm, or motor vehicle to reduce the number and severity of injuries. According to the Centers for Disease Control (2013), *motor vehicle crashes* account for approximately half the deaths from unintentional injuries while *other* unintentional injuries rank second and *falls* rank third, followed by poisoning, suffocation, and drowning. Falls cause the majority of deaths and severe injuries from head trauma among children under age 14 years, account for 90 percent of the most severe playground-related injuries treated in hospital

emergency departments (mostly head injuries and fractures), and one-third of reported fatalities (CDC, 2013). Improving the understanding of the variables involved in these types of unintentional injuries that can happen to children while they are attending CCCs can lead to improved understanding and development of injury prevention activities (NAPNAP Position Statement, 2008; Tanz, 2008).

Because of the lack of purposeful intent, it is often taken for granted or mistakenly believed that such injuries happen by chance and are the result of unpreventable accidents. However, the opposite is true. Most injuries are predictable and preventable (CDC, 2013). Furthermore, it costs far less to prevent injuries than to treat them. National figures indicate that the estimated cost of unintentional childhood injuries is more than \$200 billion each year, with the estimated cost per child injured equaling approximately \$17,000 (Centers for Disease Control and Prevention, 2011). Meanwhile, it is also known that the margin of cost for injury prevention to medical costs is significantly less expensive and can prevent further long-term costs associated with incomplete treatment and short and long-term disabilities from unintentional injuries (Davis, 2012; Zhiqin et al., 2012). For example, research demonstrated that every dollar spent on poison control saves \$6.50 in medical costs (Danesco, Miller & Spicer, 2000).

The issue of unintentional injuries to children in CCCs has significance to pediatric health care providers in all areas of health from primary to tertiary care. With their expertise and knowledge of children, health promotion, and community interventions, pediatric health care providers are prime candidates to be active proponents in the prevention and reduction of injuries to children, cutting across all sectors of the health care system. For example, the pediatrician in the emergency room must be able to

identify the mechanism and type of injury to provide medical care to the injured child. The pediatric nurse practitioner in the primary care setting needs knowledge of injury prevention strategies to provide education to parents and children about injury prevention. The public health nurse can address the issue of injury prevention policies while documenting injury rates and evaluating injury prevention strategies in the environments which they occur.

Ultimately, pediatric health care providers' abilities to promote prevention of injuries to children in CCCs are dependent on their knowledge of the policies, behaviors, and environments that impact such injury occurrences and prevention strategies (American Academy of Pediatrics, 2011; Christoffel & Gallagher, 2005; Tanz, 2008; Ulione, 1997). To facilitate the development of effective injury prevention strategies clinicians need to have a better understanding of children who can be identified as "at risk" for injury occurrence in CCC. Much of the research surrounding unintentional injuries identifies children as "at risk" based on their chronological age or a discrete personality characteristic such as temperament or aggressive behavior. Yet, pediatric health care providers spend much of their time identifying and addressing issues related to children's health based on the interaction of components of social, behavioral, physical and motor skills and the environment, knowing that the chronological age of a child may or may not correlate with their developmental age. It is known that the age range for normal development of specific types of developmental skills is wide (e.g., running with coordination can occur anywhere between 14 and 25 months of age; normal capability of speaking in a way understandable to a stranger can occur between 36 and 48 months of age) (Levine, Carey & Crocker, 1999). Yet, children are often grouped by age in CCCs

and injury research focuses on children primarily by the age of each child versus the development level of each child. Consequently, by studying injury occurrence with the independent variable of age instead and not developmental level may lead to erroneous generalizations about the nature of injury occurrence in CCCs.

Specific Aims

There were three specific aims for this dissertation study. They were:

1. Describe unintentional injuries that occur to children, ages 15-36 months old, in child care centers based on two waves of data from a national data set.
2. Examine the association between development and the occurrence of unintentional injuries to children, ages 15-36 months old, in child care centers.
3. Describe the ecological context of unintentional injury occurrence to children, ages 15-36 months old, in child care centers.

Review of the Research Literature

Review of the research pertaining to injuries to children in CCCs showed that research in this area does not fit into a clinical behavioral perspective, but instead, much of the research flows from the perspective of epidemiology. Incorporated into the epidemiologic perspective is the inclusion of age as part of basic demographic variables. Consequently, a framework incorporating epidemiology and the clinical behavioral perspective (affective, cognitive, motor, physical [including chronic illness and age], miscellaneous behaviors and environmental context) was used to organize the literature review.

Epidemiology Injury Research

The field of injury research is relatively young and evolving. From a conceptual standpoint, it has only been in the last 40 years that researchers have stopped thinking about injuries as accidents that are unavoidable and unpredictable, and started looking at injuries as preventable and predictable incidents that could be understood and controlled (Barss, Smith, Baker, & Mohan, 1998; Christoffel & Gallagher, 2005; Gielen, Sleet & DiClemente, 2006; Haddon & Baker, 1981). Another theoretical advance has been the move away from associating an injury event with a single individual characteristic, such as drunk driving, and then inferring causation from it. Since the late 20th century, there has been growing awareness that single-cause explanations of injury events are incomplete and misleading (Barss, Smith, Baker & Mohan, 1998; Christoffel & Gallagher, 2005; Gielen, Sleet & DiClemente, 2006).

This particular conceptual shift is connected to a shift in the theoretical focus on injuries from a biological and behavioral emphasis on the individual, to a concern with the environmental context within which injury occurs (Christoffel & Gallagher, 2005; Finney, Christophersen, Friman, Kalnins, et al., 1993; Gielen, Sleet & DiClemente, 2006). The occurrence of an injury commonly involves a complex series of events that include environmental factors and the interaction of human performance and the task to be performed (Barss, Smith, Baker, & Mohan, 1998). Intervention is possible at several points in the causal chain of events leading to the occurrence of an injury once hazardous exposures and circumstances are known (Barss, Smith, Baker, & Mohan, 1998).

Coinciding with these changes in the perception of the nature of injuries, the science of injury prevention has moved away from a highly individualistic approach to a

public health approach that focuses on multidisciplinary collaborations and research (Barss, Smith, Baker & Mohan, 1998; Christoffel & Gallagher, 2005; Finney, Christophersen, Friman, Kalnins, et al., 1993; Gielen, Sleet & DiClemente, 2006). This public health approach to injury research has led to the utilization of epidemiology and epidemiological methods to guide in the understanding of injuries and injury prevention (Christoffel & Gallagher, 2005; Finney, Christophersen, Friman, Kalnins, et al., 1993; Gielen, Sleet & DiClemente, 2006). Subsequently, much of the research pertaining to injury and injury prevention flows from the perspective of epidemiology, emphasizing that injury results from exposures to specific hazards and affects certain high risk groups more than others (Barss, Smith, Baker, & Mohan, 1998).

Some of the earliest injury research was conducted by the mid-twentieth century epidemiologist, John Gordon, who utilized the classic triad of epidemiology, host-agent-environment, to explain the components of injuries (Christoffel & Gallagher, 2005). Further research by Gibson in 1961 and then Haddon in 1972 led to the understanding that energy (its interchange or absence) is the *agent* component of the triad (Christoffel & Gallagher, 2005). This work and research in the field of injury biomechanics have resulted in the systematic conceptualization of injury as any unintentional or intentional damage to the body resulting from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as heat or oxygen (Christoffel & Gallagher, 2005). Since then the research into injury data has expanded to include multiple disciplines such as psychology, medicine, and environmental biomechanics (Finney, Christophersen, Friman, Kalnins, et al., 1993).

Injury research specifically related to CCCs also developed in the late 20th century, culminating in the June, 1992, *International Conference on Child Day Care Health: Science, Prevention, and Practice*, sponsored by the Centers for Disease Control and Prevention (CDC). Up until, and since, that conference much of the injury research focus is on the epidemiological perspective, and uses an epidemiologic framework to describe the type and prevalence of injuries to children in CCCs. An indication of the continued interest in injury research specific to this area is demonstrated by the CDC - National Center for Injury Prevention and Control currently calling for epidemiological studies that describe the type, setting, and risk factors of injuries to children in CCCs (CDC, 2011). This epidemiological perspective of injury and injury occurrence, focusing on the distribution and determinants of injuries in specified populations, underpins much of the theoretical and applied injury research that is in the literature.

Research on injuries to children in CCCs

The earliest systematic studies of injuries to children in CCCs did not occur until the 1980s and focused on describing the occurrence of injury (Aronson, 1983; Chang, Lugg, & Nebedum, 1989; Davis & McCarthy, 1988; Elardo, Solomons, & Snider, 1987; Landman & Landman, 1987; Ponka, Salminen, & Ponka, 1989; Rivara, 1987; Sack, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Solomons, Lakin, Snider, & Paredes-Rojas 1982). These early studies (Aronson, 1983; Chang, Lugg, & Nebedum, 1989; Davis & McCarthy, 1988; Elardo, Solomons, & Snider, 1987; Landman & Landman, 1987; Ponka, Salminen, & Ponka, 1989; Rivara, 1987; Sack, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Solomons, Lakin, Snider, & Paredes-Rojas 1982) were descriptive studies by epidemiologists looking at the types, prevalence and risks of injuries in CCCs.

These studies and most epidemiologic studies since (Cummings, Rivara, Boase, & MacDonald, 1996; Kotch, Dufort, Stewart, Fieberg, McMurray, O'Brien, Ngui, & Brennan, 1997; Lee & Bass, 1990; Sellstrom, Bremberg, & Chang, 1994; Thacker, Addiss, Goodman, Holloway, Harrison, & Spencer, 1992), tend to characterize their findings by either the type of injury (e.g., falls and choking) (Alkon, Geneviro, Kiser, Tschann, Chesney, & Boyce, 1994; Chang, Lugg, & Nebedum, 1989; Rivara, Diguisseppi, Thompson, & Calogne, 1989; Sacks, Smith, Kaplan, Lamert, Sattin, & Sikes, 1989), severity of injury (e.g., requiring medical treatment or not)(Chang, Lugg, & Nebedum, 1989; Cummings, Rivara, Boase, & MacDonald, 1996; Lee & Bass, 1990; Ponka, Salminen, & Ponka, 1989; Sellstrom, Bremberg, & Change, 1994), injury occurrence (per hours of childcare) (Rivara, DiGuisseppi, Thompson, & Calonge, 1989; Thacker, Addiss, Goodman, Holloway, Harrison, & Spencer, 1992), location (playground vs. home child care) (Kotch, Dufort, Stewart, Fieberg, McMurray, O'Brien, Ngui, & Brennan, 1997), or relative risk (Kotch, Dufort, Stewart, Fieberg, McMurray, O'Brien, Ngui, & Brennan, 1997). One study (Sacks, Smith, Kaplan, Lamert, Sattin, & Sikes, 1989) looked at the seasonal risk of injuries, and most of the studies (Bijur, Golding & Haslum, 1988; Cummings, Rivara, Boase, & MacDonald, 1996; Chang, Lugg, & Nebedum, 1989; Kotch, Dufort, Stewart, Fieberg, McMurray, O'Brien, Ngui, & Brennan, 1997; Lee & Bass, 1990; Ponka, Salminen, & Ponka, 1989; Rivara, Diguisseppi, Thompson, & Calonge, 1989) also looked at injury occurrence related to gender and/or age.

In 1989, Sacks et al. estimated that the risk of an injury requiring medical attention was 14.3 per 100 children annually in day care centers, compared to 35 per 100 children in the community at large. Other researchers have found similarly low rates of

injuries in day care (Briss et al., 1994). Yet, even regulated child care centers are often not as safe as they could be (Office of Child Care Technical Assistance Network, 2013). Surprisingly, most states do not keep detailed information about deaths that occur in child care. However, projections based on states that do report suggest that 12% of the 2260 accidental deaths to children 1–4 years old in 1995 may have occurred in child care settings (Currie, 2004).

Summarily, these studies provide important descriptive information. More unintentional injuries occur in CCCs than out-of-home child care; there is a gender-specific association between the prevalence and type of injuries that occur to children in CCC; boys are more likely to be injured and have more severe injuries (Grossman & Rivara, 1992); and age plays some undefined role in the occurrence, type, and severity of injury, to children in CCCs. There is a relatively low reported incidence of unintentional injury occurrence in CCCs, but as there is no uniform reporting of unintentional injury occurrence across states, there is a lack of definitive information as to the actual injury rates. Available studies do not go beyond the basic epidemiologic description of who, what, how, where, and when of injury occurrence in CCCs. The results and conclusions of these studies either stop at basic description of the occurrence of injury or focus on what can be done to modify the physical environment of CCCs (e.g., modifying playground equipment). Further, the samples of these studies are not randomized which leads to questions concerning biases related to multiple factors such as location, race, economic status, etc. The results and the conclusions of these studies do not look at the relationships among each of the variables in terms of potential interactions and/or confounders, and they do not address any of the developmental aspects of the children

being injured that could play a significant role in injury occurrence and ultimately, injury prevention.

Development

Affective development

The literature pertaining to affective aspects of child development and unintentional injuries in CCCs demonstrated that a child's personality as perceived by parents had an effect on the occurrence of unintentional injuries to the child attending a CCC (Dal Santo, 1995). The first of these studies was a prospective study which showed that there was a weak, but highly significant association between a child's personality and both injury risk and rate of repeated injuries (Dal Santo, 1995). Using the 9-item, semantic differential Child Temperament Scale developed by Glik et al. in 1989, which describes the child's risk taking behavior as perceived by the mother, Dal Santo (1995) found that children who were perceived by their parents to be more active, risk taking, and hard to manage had significantly higher injury risk and rates of repeated injuries. The reliability of the Child Temperament scale used in the study was 0.63. Dal Santo also found that children older than 2.5 years of age were at higher injury risk than children younger than 2.5 years of age. The most frequent types of injuries that occurred in Dal Santo's study included bruises, scrapes, cuts, and crushing injuries which comprised a total of 85.4% of the total injuries.

Three more studies described the types of personalities that were associated with injuries. In a sample of 50 children (ages 3-11 years) attending summer day camp for economically underprivileged youth, Jacquess and Finney (1994) found that, based on multiple linear regression, for injuries treated medically within one year after camp, three

variables: medically treated injury during the year before camp., injury during camp, and the Eyberg Child Behavior Inventory (ECBI) opposition factor contributed significantly, accounting for 50% of the variance ($R^2 = .50$, $F = 15.41$, $p < .0001$). Specifically, parent-reported oppositional behavior of children accounted for 0.10 ($p < .0001$) of the variance of medically treated injuries that occurred in the year after camp attendance (injury during camp accounted for 0.07 of the variance and injury before camp accounted for 0.34 of the variance). However, parent-reported oppositional behavior of children accounted for none of the variance for home treated injuries (injury before camp accounted for .21 [$p < 0.0008$]). In contrast to many research studies that have reported that the strongest behavioral predictors of injury are aggression and overactivity (Jacquess & Finney, 1994), the variables of aggression and hyperactivity as measured by the ECBI conduct scale did not independently account for outcome variance in the dependent variable of parents' reports of medically treated (28%) or home treated (22%) injuries. The specific types of injuries included closed head injury, hurt ankle, broken toes, stitches in knee, infected cut, cuts from bicycle wreck, puncture wound in foot, sprained foot, chipped elbow, cut on head, cut wrist, bruises, and abrasions (Jacquess & Finney, 1994). However, the authors leave at least some ambiguity to the nature of the actual ECBI instrument, which they describe in terms of reliability and validity as, "A reliable and valid parent-report questionnaire that assesses whether 36 behaviors are problematic and the rate of occurrence for each behavior (Jacquess & Finney, 1994, p82)."

In another prospective longitudinal study, Horwitz, Morgerstern, DiPetro, and Morrision (1988) also identified a child's high activity level ($b = 2.561$, $SE = 1.184$, $P = .031$) as one of four independent factors significantly related to the occurrence of any

childhood injury encountered in a prepaid group practice ($n = 513$) during a 12-month period. The three other independent factors identified included a history of use of medical services for previous injuries ($b = 0.922$, $SE = 0.265$, $p < .001$), high rate of medical care utilization in the follow-up period ($b = 0.799$, $SE = 0.255$, $p = .002$), and children whose mothers had negative attitudes toward the medical establishment ($b = 0.511$, $SE = 0.247$, $p = .039$). There is a lack of specificity in the information that led to these results related to any further delineation of severity or type of injury and how these variables were measured.

In a two-year cohort study of preschool age children attending four urban child care centers ($n = 140$), Alkon-Leonard (1995) also found that boys with internalizing (social withdrawal and anxiety/depression) and externalizing problems (aggression and destructive behavior) had the highest injury rates compared to boys in equivalent centers.

These three articles (Alkon-Leonard, 1995; Horwitz et al, 1988; Jaquess & Finney, 1994) demonstrate that components of a preschool child's personality do have an effect on the type and risk of injury, suggesting the need for further investigation into the identification of the specific components of a child's personality that predict injury outcomes. However, along with the specific ambiguities mentioned above, there are several methodological issues that affect any conclusions that may be drawn from these studies as a group. First and foremost is the issue of what actually constitutes an affective behavior. Each of the studies looks at vague descriptors of affective behavior such as "activity level," "oppositional behaviors," and "aggressive behavior" without explicitly delineating what specific personality or behavioral traits constitute these affective behaviors. The identification of injuries appears to be at least broad and at most

known only when it is seen. Finally, samples within these studies are confounding, since some studies classify results in terms of gender and some do not. Consequently, the best overall significant and consistent conclusion that can be drawn is that children with some level of “increased” activity appear to be at a higher risk of injury. Also, there is no uniform or consistent definition of what actually is classified as an injury.

Generally, these studies showed that children with increased aggression and increased activity had higher rates of injury (Dal Santo, 1995; Horwitz, Morgerstern, DiPetro, & Morrision, 1988; Jacquess & Finney, 1994). However, Jacquess and Finney’s (1994) study showed that aggression and overactivity specifically did not independently account for more severe injuries requiring treatment outside of the CCC. Further, there is some evidence that any extreme in behavior (e.g., social withdrawal or aggression) has a direct effect on the occurrence of injuries to boys (Alkon-Leonard, 1995). Overall, it appears that a child’s affect has some relationship to the occurrence of unintentional injuries to children in CCCs, but it is not known whether this relationship is possibly mediated by gender or if the child’s affect accounts for a significant amount of the variance in this relationship.

Cognitive development

There is a dearth of literature pertaining to cognitive aspects of child development and unintentional injuries in CCCs. Only one study (Ast, 1995) was identified pertaining indirectly to this area: it looked at preschool children’s ability to differentiate between moral and safety rules. Results of this study demonstrated that preschool children (two years eight months of age to six years four months of age) were capable of differentiating between safety and moral rules with increasing differentiation as age increased. The

study did not examine the relationship between children's reasoning and actual occurrence of injury, so it is not known if this specific cognitive ability plays a significant role in the occurrence of unintentional injuries to children in CCC. Further research needs to be done to determine what, if any, relationship between cognitive development and unintentional injuries in CCCs exists.

Motor development

There is a dearth of literature pertaining to motor aspects of child development and unintentional injuries in CCCs. Only one study (Leland, Garrard, & Smith, 1994) was found that directly or indirectly incorporated motor development, as defined by these parameters, into study variables. In a retrospective comparison study of injuries over a one year period to children (age 30.1 months - 72 months) in two separate day care programs, one for children with disabilities ($n = 36$) and one for children without disabilities ($n = 209$), Leland, Garrard, & Smith (1994) found that children with disabilities (63% mentally retarded or cognitively impaired, 6% autistic, and 11% CP) had higher rates of injury defined as, "...A physical insult to a child that resulted in a report in the log of either day-care program (p. 403)," than those without disabilities ($\chi^2 = 3.9$, $df = 1$, $p < 0.05$). The researchers concluded that, ... "Children with disabilities were more likely to be involved in a dispute with another child, while those without disabilities were more likely to experience an injury while running or playing on playground equipment (p 407)" (Leland, Garrard, & Smith, 1994). However, these findings do not go beyond a basic comparison of injury rates as there is no explanation of what actually constitute a "severe" injury and what activities children were actually engaged in at the time of injury, nor is their exposure rates to different environments considered.

Leland, Garrard, and Smith (1994) also demonstrated that children with general neurological deficits and disabilities had higher rates of injuries while at CCCs compared to their healthy counterparts and that these injuries were attributed to conflicts between children. This particular study provided insight into the mechanism of injury that occurs to disabled children in CCCs who experience an injury, but it did not explicate if there is a relationship between motor development and the occurrence of unintentional injuries to the general population of children in CCCs. Further research that explicates if such a relationship exists needs to be conducted.

Physical development

Physical development variables such as height, weight, and mass, could play a role in injury rates and the types and seriousness of injuries. For example, a larger (taller and/or heavier) child could possibly inflict more severe injuries whereas a smaller (shorter and/or lighter) child could be more likely to inflict less severe injuries. Subsequently, parameters relating to a child's development of body parts were used to guide the review of the injury literature for research related to physical development. One study that looked at injuries in chronically ill children was found. Several studies using chronological age as a proxy for a child's physical development and, thus, as an indirect measure of a child's physical development were found. However, it should be noted that because it is known that growth and development milestones are at best general guidelines, as opposed to hard facts, to use age alone as a proxy for a child's actual level of growth and development could lead to false conclusions. There were no studies found that directly incorporated physical development, as defined by these parameters, into study variables.

Chronological Age

In reviewing the injury literature for the antecedents of unintentional injuries, age is used again and again as a descriptive variable for identifying children at risk for unintentional injuries. Several research studies (Alkon, Ragland, Tschann, Genervro, Kaiser, & Boyce, 2000; Bijur, Golding, & Haslum, 1988; Chang, Lugg, & Nebedum, 1989; Cummings, Rivara, Boase, & MacDonald, 1996; Lee & Bass, 1990; Ponka, Salminen, & Ponka, 1989; Rivara, DiGuseppi, Thompson, & Calonge, 1989; Sacks, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Thacker, Addiss, Goodman, Holloway, & Spencer, 1992) were identified as directly incorporating age as a determinant of risk for unintentional injury. These studies provided evidence that occurrence of injury is affected by age.

In a cohort study of 10,394 British children, Bijur, Golding, and Haslum (1988) found that the number of injuries before 5 years of age was the best predictor of injuries (defined as medical care being sought) reported between 5 and 10 yrs of age, followed by being a boy, aggressive child behavior, young maternal age, and many older and few younger siblings. Alkon, Ragland, Tschann, Genervro, Kaiser, Boyce (2000) also found that age was significantly associated with injury (defined as “an event resulting in bodily harm, reflected by a physical mark or in duration” [Alkon et al., 2000, p. 215]) rates in CCCs, with younger children sustaining higher rates of injury than older children. There was no presentation of results broken down along lines of severity of injuries. Overall, these researchers found that children 2.0-3.5 years of age had a mean injury rate of 6.8/2,000 exposure hours ($p = 0.01$), whereas children 3.6-6.0 years had a mean injury rate of 4.5/2,000 exposure hours.

Other research studies have also shown that rates of injury in child day care vary by age, although the age of highest incidence varies among studies (Thacker, Addiss, Goodman, Holloway, & Spencer, 1992). A study by Cummings, Rivara, Boase, and MacDonald (1996) found with a 95% confidence interval that, adjusting for hours of day care attendance, age-specific rates of injury were lowest for infants (0.7 injuries per 100 000 hours), were more than fourfold greater for children one to two years of age (3.3 injuries per 100 000 hours), fell almost to infant levels for three and four year-old-children (1.1 injuries per 100 000 hours), and rose again for children over age five years (2.2 injuries per 100 000 hours), comparable to the results in the prior study. Another study by Chang, Lugg, and Nebedum (1989) found that boys two to three years of age showed the highest injury rate and older girls, four to five years of age, showed the lowest injury rate. Sacks, Smith, Kaplan, Lambert, Sattin, and Sikes (1989) found in the Center for Disease Control state-wide study in Georgia, a calculated injury rate of 1.77 injuries per 100 000 child hours in day care; among preschool age children, infants had the lowest rate (0.77), and 2-year-old children had the highest rate (2.26). Almost half the injuries occurred on the playground, and falls were involved in 70% of such injuries. Ponka, Salminen, and Ponka (1989) found that the incidence of injury was highest among 2-4 year olds, with an over-representation of accidents found during the morning hours. Rivara, DiGuseppi, Thompson, and Calonge (1989) found that in day care, three- to less than four-year-olds had the highest injuries per 100 000 child hours (5.88) and two to three year olds had the lowest (0.59). Lee and Bass (1990) found that, based on injury reports by parents, the highest number of injuries occurred among children three and four years of age. Children three to five years of age had the highest number of reported

injuries, followed by school-age children (six years and older), and toddlers one to two years. Infants had the lowest number of reported injuries. Lee and Bass (1990) go further and specifically describe the type of injury by age. For toddlers, the majority of injuries was related to running and body contact with another toddler and was described as scratches, abrasions and human bites. In the 3-5 year old program, the majority of the injuries occurred during horseplay or while the children were running or fighting. In the school program (children six years of age and older) the majority of the injuries occurred during horseplay or while the children were running or fighting. For the 3-5 year olds, the majority of the injuries were scratches and abrasions 33%, followed by bumps (22%) and human bites (15%). Face injuries were the most frequent injuries in all groups, followed by hand/elbow/arm injuries. These studies were epidemiologic designs which do not go beyond descriptive parameters to explore what it is about age that may have contributed to the cause or type of injury.

Generally, these studies show that infants have the lowest rates of injury compared to older toddlers and preschool children (2-5 years of age). Gender also appears to affect injury rates. However, due to the variation in settings and samples, it is not clear whether these are direct effects or not. The research indicates that there is general agreement on the fact that a child's age is a significant factor in the occurrence of unintentional injuries. What is unclear is what accounts for the similarities and differences in the trends of age associated with increased injuries. There are no clear indicators of why in some studies toddlers have more injuries and in other studies older children have more injuries. Also, it is not known if the apparent effect of age is due only

to the child's age itself or underlying developmental issues or interaction effects with the CCC environment. Further research needs to specifically look at these issues.

Chronic illness

Two studies were found that looked at chronic illness and disability (Larson & Pless, 1988; Bourguet & McArtor, 1989). The two identified studies demonstrated that there is a relationship between preschool children having a chronic illness and increased injury risk. Larson and Pless (1988) prospectively looked at risk factors for injury in a 3-year-old birth cohort. They found that the child's physical health was not associated with the occurrence of an injury in their study. However, children with a chronic illness were at significantly greater risk for the occurrence of a treated injury, with both elevated crude and adjusted relative risks found. In a cohort of children less than six years of age in one Ohio health practice center, Bourguet and McArtor (1989) also found that a history of a chronic medical condition was associated with increased injury risk. Neither of these studies specifically looked at unintentional injuries of children with chronic illness while they are in CCCs.

Miscellaneous Behaviors

Early injury research (Langley, McGee, Silva, & Williams, 1983) looked at the concept of proneness to injuries believing that there were some children who would constantly and consistently be at higher risk for unintentional injuries than the average child. These children would have repeated injuries and were thought to be accident prone (Grossman & Rivara, 1992). However, according to Grossman and Rivara (1992) numerous researchers in the field of unintentional injury research have found no evidence to support the concept of accident proneness and the concept appears to have been almost

completely abandoned. However, Grossman and Rivara (1992) also report that it is known that children who are engaged in risk-taking behaviors are more likely to be injured.

There are miscellaneous behaviors that have been identified as contributing to, in varying degrees, unintentional child injuries, and that are relevant to developmental parameters as indirect descriptors of one or more aspects of development as defined above. These miscellaneous behaviors include child behavior problems in general and the social competency and ego-resiliency of children.

Kennedy and Lipsitt (1998) found that children who described themselves as *high risk-takers* engaged in potentially unsafe activities and had higher accident and injury rates for both minor and severe injuries. Kennedy and Lipsitt (1998) also found that cognitive ability was a codependent predictor with injury behaviors of risk-taking for four to five year old boys. In a study of five to eleven year olds, Bradbury Janicke, Riley, and Finney (1999) found that significant predictors of increased injury liability (medically attended injuries) included child behavior problems (not specifically delineated), as well as generally younger child age, more children at home, low child social competence, three indices of reduced child health, and high maternal anxiety. Alkon-Leonard (1995) found that boys with a lack of ego-resiliency (operationalized as internalizing and externalizing problems) had a higher risk of injury, while girls with a lack of ego-resiliency had a lower risk of injury. Dal Santo et al. (2012) found that white children whose mothers were unemployed and whose homes needed repair were reported to be at higher injury risk than other children. Furthermore, children's behavioral characteristics as well as their being older than 2.5 years predicted a higher injury risk. (Dal Santo et al.,

2012). Guilfoyle et al. (2012) found that parents' knowledge of their child's development and self-efficacy played a positive role in injury prevention.

Ecological Context

Several environmental factors that potentially influence how developmental factors come together in the ecological context of child care were also identified in the research literature. This research demonstrated that there is a relationship between both immediate physical and broader social environmental factors and the occurrence of unintentional injuries to children in CCCs (Alkon-Leonard, 1995). In terms of location, there is no clear distinction as to the predominance of a specific physical location where injuries occur, although Sacks et al. (1989) found most CCC injuries occur outdoors on playgrounds, and it is generally accepted that falls on playgrounds account for a significant number of unintentional injuries to young children. However, beyond playground equipment specifications, it is not clear what factors in the physical environment result in injury. Furthermore, environmental factors outside of the CCC, such as maternal perceptions of risk (Dal Santo, 1993), personal maternal aspects (Larson & Pless, 1988), and culture (Kennedy and Rodriguez, 1999) have some relationship to the occurrence of injuries in preschool children in general.

Several recent studies have suggested some relationship between the ecological context and unintentional injury occurrence to children in child care centers. Schwebel et al. (2006, 2007) found that being enrolled in child care decreased unintentional injury occurrence. Pearce et al. (2010a, 2010b) found that the factors of policy, maternal employment and child care enrollment all played some role in unintentional injury occurrence. Davis, Godfrey, and Rankin (2012) found that children who attend childcare

centers 10 hours or more per week have higher unintentional injury incidence compared to children cared for by parents at home. None of these studies clearly identifies the specific relationship between child care center and unintentional injury occurrence.

Methodological Issues in the Research Literature

There are numerous issues with the validity and reliability of these studies. At the measurement level, there are issues with the basic lack of a standard definition of an injury and the lack of uniformity of the definition among studies. Injuries are defined across the entire spectrum from minor (requiring no medical attention) to major (requiring medical attention), effectively making the dependent variable of these studies different, and impeding the possibility of accurate comparison or accumulation of knowledge regarding study outcomes. Furthermore, many of the studies use parental recall as the basis for determining the extent of injury, allowing recall bias to potentially affect the dependent variable outcome resulting in overestimated or underestimated injury occurrences. This lack of uniformity also affects many of the independent variables that are examined, particularly age, which are broken down into different groupings in different studies resulting in inconsistency in the results. Also, there is a lack of specificity in many of the independent variables. For example, the independent variable of *child behaviors* could constitute anything from positive to negative behaviors and everything in between. This lack of clarity dilutes the meaning of results.

The fact that most of the study designs are prospective cohort studies with small, non-randomized samples decreases the validity of these studies and their potential applicability to populations beyond those of the same composition of the particular study. The lack of randomization may also allow for the outliers of extreme behaviors to turn up

as significant results when they actually are not. There are also reliability and validity issues with the lack of reporting of reliability of the instruments used to measure various independent variable constructs and the lack of reporting of the type of instruments used to measure various constructs.

Conclusions and Implications

Based on this review of the literature pertaining to developmental factors and the ecological context of unintentional injuries, several substantive and methodological conclusions can be made. The systematic study of unintentional injuries as something more than *unavoidable accidents* with the possibility for understanding and control, has only occurred in the last 40 years. Most of what is known about injuries to children is based upon descriptive epidemiologic research, although some research from the field of developmental psychology has looked at individual child characteristics in an attempt to identify children at high or increased risk of injury occurrence. What has been done looks at development, not in terms of the clinical behavioral guidelines traditionally associated with development (affective, motor, physical, and cognitive), but in terms of proxies such as age and gender. Although the extant research gives us a snapshot of the types of unintentional injuries and the types of children involved, this snapshot lacks clarity and detail about the developmental specifics in terms of behaviors, motivations, and competencies that ultimately contribute to, if not cause, injuries.

In terms of injuries to children in CCCs, the research is even less developed, and there is a current emphasis in the injury research field and the research literature on identifying specific environmental and personal factors that increase the chance of an unintentional injury occurring to a child. Most of the research in this area is retrospective

and focused on identifying individual, discrete environmental and/or behavioral characteristics which may put children at risk for injury in the CCC. There is no identifiable research pertaining to unintentional injuries in child care centers that specifically looks at or acknowledges the relationships among the developmental factors, environmental factors, and the larger ecological context surrounding these factors.

However, there is acknowledgment of the importance of the complex relationships among injury determinants such as maternal anxiety level and number of siblings. There also has been some work looking at the possible interaction between injuries and the environmental context at CCCs in terms of how and where the injury occurs. However, these studies do not look at the CCC environment beyond its basic setting. Only one study was identified that looked at quality of child care. None of the studies look at the various factors within the child care setting, such as child care providers' perceptions of children and their risk for injury, or their knowledge level (or lack thereof) regarding injury prevention, nor do they adequately examine influences outside the immediate CCC environment (e.g., policies and family support). Due to the lack clarity on basic measures and design flaws among studies, there are few with valid and reliable results that are generalizable to a larger population. Furthermore, most of these studies do not go beyond identification of individual risks, and do not look at the relationships among risks.

In conclusion, review of the literature over the past 40 years shows a lack of research specifically related to unintentional injury occurrence, child development, and the ecological context of child care centers. Although the research related to each isolated variable is present, there is a lack of literature pertaining to the relationship of

these variables. Thus, there is a need for investigation into the occurrence of unintentional injuries that has an ecological focus which combines both developmental and epidemiological emphasis on the interaction between child development, particularly of toddlers (15-36 months of age), and the broader ecological context of injuries. To facilitate such a program of research, this author proposes that there must be better identification of and better understanding of the basic independent developmental and environmental variables associated with unintentional injuries, and these variables' discrete predictive ability of unintentional injuries. There also needs to be further identification and understanding of the significant components of the ecological context of unintentional injuries that occur to children in CCCs.

Most of the current research in this area is descriptive and focuses on identification of discrete independent variables directly associated with unintentional injuries (e.g., children with aggressive personalities have increased occurrence of unintentional injuries). However, just as development is not the result of discrete, isolated aspects of the child, injury-related developmental factors may not occur as discrete, isolated independent variables. Research should be undertaken to not only identify injury-related developmental variables but also their potential occurrence as interactive variables within the child. Furthermore, injury research currently focuses on a direct cause and effect relationship between independent and dependent variables (i.e., falls from playground equipment by three-year-old children results in injury) when the reality is that there are numerous factors occurring and interacting that result in the type of injury (e.g., the child care center's policies on supervision and playground equipment, the parents' and peers' influence on the child, the child's physical growth and cognitive

understanding that result in injury and the qualitative aspects of that injury [e.g., type and severity]).

Theoretical Rationale

The theoretical rationale guiding this study includes the epidemiological model of Host-Agent-Environment (Haddon & Baker, 1981) and concepts from Bronfenbrenner's (1979) *Ecology of Human Development*. Some of the earliest injury research was conducted by the mid-twentieth century epidemiologist John Gordon who utilized the classic triad of epidemiology, host-agent-environment, to explain the components of injuries (Christoffel & Gallagher, 2005). Further research by Gibson in 1961 and then Haddon in 1972 led to the understanding that energy (its interchange or absence) is the *agent* component of the triad (Christoffel & Gallagher, 2005). This work and research in the field of injury biomechanics have resulted in the systematic conceptualization of injury as any unintentional or intentional damage to the body resulting from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as heat or oxygen (Christoffel & Gallagher, 2005). Since then the research on injury has expanded to include multiple disciplines such as psychology, medicine, and environmental biomechanics (Finney, Christophersen, Friman, Kalnins, et al., 1993).

Bronfenbrenner's ecological theory was selected as a second theoretical rationale for this study because it addresses the important relationship between child development and relevant environments. The term ecology is derived from biological science and refers to the interrelation between organisms and their environments (Sallis & Owen, 1997). Thus, *ecological* refers to modes, frameworks or perspectives rather than specific

variables. The ecological perspective, as it has evolved in sociology, psychology, economics and public health, focuses on the nature of people's transactions with their surroundings and the connection between people and their environments (Sallis & Owen, 1997). Within an ecological framework, individuals and their environments are viewed as mutually shaping systems, each changing over time, each adapting in response to changes in the other (Bronfenbrenner, 1979). Health is seen as a product of the interdependence between the individual and subsystems of the ecosystem (Green, Richard, & Potvin, 1996).

Garbarino (1992) applied the ecological perspective specifically to children in the sociological environment by stating that there are different levels of related social systems around the developing child in which what happens outside the immediate experiences of a child affects what goes on inside those experiences as much as, if not more than, do the internal forces of the child. An individual organism and the environment engage in reciprocal interaction, that is, each influences the other in an ever-changing interplay of biology and society, with intelligence and emotion as the mediators, and identity and competence as the outcomes (Bronfenbrenner, 1979). "The distinguishing characteristic of the ecological perspective is its insistence on a holistic understanding of individuals within their social context and on tracing the connections between individuals and the environmental forces that affect them (Wharf, 1988, p. 194)." Consequently, the ecological perspective can be used effectively to capture and incorporate the multiple environmental, behavioral, and educational factors that are involved with injuries to children in CCCs. Furthermore, it is known that the most effective injury control programs involve a combination of approaches, including

education, environmental modification, administration, and/or legislative components (AAP, 2000). An ecological perspective specifically addresses and incorporates the multiple components of injuries, the prevention of injuries, and intersecting factors that can be used to provide context for injuries to children in CCCs. By exploring the relationship between developmental factors and the ecological context of unintentional injuries to children in child care centers within the context of the more traditional host (child development)-agent (energy)-environment (ecological context of CCCs) framework, more effective interventions may be developed.

Conceptual Framework and Definitions

Conceptual definitions of the variables guiding the design of this study are as follows, and their conceptual relationships can be seen in Figure 1. *Development* is a combination of affective, cognitive, motor, and physical skills. *Chronological Age* is the time elapsed since birth. *Unintentional Injury* is any injury without known intentional component causing harm to the child. *Ecological Context* for this study will be at the level of the *microsystem* which is “a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics” (Bronfenbrenner, 1979).

Statement of the Problem

Specific Aims and Research Questions

There were three specific aims and six research questions for this dissertation study. They were:

Specific Aim 1: Describe unintentional injuries that occur to children, ages 15-36 months old, in child care centers based on two waves of data from a national data set.

Research Question 1: What are the characteristics of unintentional injuries (e.g., type of injury and severity) that occur to children while in the CCC setting at ages 15, 24, and 36 months?

Research Question 2: What portion of reported unintentional injuries to children ages 15, 24 and 36 months occur while in the CCC setting?

Specific Aim 2: Examine the association between development and the occurrence of unintentional injuries to children, ages 15-36 months old, in child care centers.

Research Question 3: What is the relationship between chronological age and mental development age in children ages 15, 24 and 36 months old who experience an unintentional injury while in CCCs?

Research Question 4: Is a difference in mental development age and chronological age related to the occurrence of unintentional injuries to children, ages 15 and 24 months old, while in CCCs?

Research Question 5: Are there differences in the characteristics of unintentional injuries that occur in CCCs and do not occur in CCC in children, ages 15 and 24 months old, and who have a development age that is different from their chronological age compared to the occurrence of unintentional injuries to children, ages 15 and 24 months old, who have a development age and chronological age that match?

Specific Aim 3: Describe the ecological context of unintentional injury occurrence to children, ages 15-36 months old, in child care centers.

Research Question 6: What are the characteristics (e.g., physical plant, preparation of child care workers, and ratio of child care workers to children) of the ecological context of CCCs that may be related to the occurrence of unintentional injuries to children, ages 15 – 36 months old, in CCCs?

Chapter 2

Methodology

Design

This descriptive-exploratory longitudinal study used secondary data analysis on a large existing dataset, the Study of Early Child Care and Youth Development, incorporating quantitative data analysis methods to answer the research questions associated with each specific aim.

Data Source: SECCYD Dataset

The Study of Early Child Care and Youth Development (SECCYD) was a prospective, longitudinal, multi-site study that occurred in four phases from 1991 through 2008 (Phase 1: 1991-1995; Phase 2: 1996-1999; Phase 3: 2000-2004; Phase 4: 2005-2008). The SECCYD was funded by the United States Department of Health and Human Services, the National Institutes of Health and the Eunice Kennedy Shriver National Institute of Child Health and Human Development

(<http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/22361>, 2013).

The purpose of the SECCYD was to examine the influence of variations in early childcare histories on the psychological development of infants and toddlers from a variety of family backgrounds. 1,364 children and their families were followed from one month of age through seventeen years of age to identify the complex interactions among child characteristics and those of the human and physical environments in which the

children were reared. By examining the details and relationships between childcare arrangements and children's concurrent and long-term development, and identifying demographic characteristics of childcare associated with childcare quality, the study examined the relationships between child development and child care during infancy, early childhood, middle childhood, and middle adolescence.

Participants in the SECCYD study were recruited from 31 hospitals located in or near 10 US cities (Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Morganton, NC; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Seattle, WA; Madison, WI). During selected 24-hour sampling periods, 8,986 women giving birth were visited in the hospital. Of these, 5,416 met the study's eligibility criteria (briefly, English-speaking mothers age 18 or over who planned not to put children up for adoption, not to relocate in the next year, and who lived in safe and accessible neighborhoods for research; for details, see NICHD Early Child Care Research Network, 2000). A subset of this group was selected in accordance with a conditional-random sampling plan designed to ensure recruited families reflected the economic, educational, and ethnic diversity of the catchment area at each site. When the infants were 1 month old, 1,364 families (58% of those contacted; 51.7% male; 48.3% female) enrolled in the longitudinal study (see NICHD Early Child Care Research Network, 1994, 2001); for details of study design and recruitment, including informed consent procedures) (U.S. Department of Health and Human Services, National Institute of Child Health and Human Development, 2006).

Sample

The sample for this dissertation study was taken from the SECCYD data set, Phase I and Phase II, which included children from one month of age through six years of

age and their families. Inclusion criteria for the sample of children identified for this study included: (a) identification of gender; (b) age 15, 24 or 36 months; and (c) no known developmental disability. Specifically, secondary data analysis was conducted on information from 1,313 children ages 15 months, 24 months, and 36 months who had gender data reported in the SECCYD data set.

Of the 1,364 children whose families who took part in the SECCYD, data from 1,313 children were utilized in this dissertation study. Missing cases arose for a variety of reasons such as dropping out of the study. Of these 1,313 children total, 183 (13.93%) were reported to have had an unintentional injury occur during the specified time period 15, 24, and/or 36 months of age. Eight of these children (0.61%) were reported to have been injured while at a CCC.

Measures

Operational definition of variables

For the purposes of the study the following terms were operationally defined: (a) unintentional injury, (b) mental development age, (c) chronological age, and (d) ecological context. An unintentional injury was defined as – parent defined “injury” that occurred without purposeful intent that required the child’s parent or guardian to seek treatment by a medical doctor. Mental development age was operationally defined as a combination of cognitive skills (sensory-perceptual acuities and discriminations; memory, learning and problem-solving; early verbal communication; and the ability to form generalizations and classifications) as measured by the Mental Development Index of the Bayley Scales of Infant and Toddler Development assessment tool. In the SECCYD, to assess the mental development age of each child, the *Bayley Scales of Infant*

and Toddler Development (Mental Development Index) was administered to children participating in that study at 15 months of age (Child Care and Early Education Research Connections, 1999). Then, at 24 months of age, the Mental Development Index of the *Revised Bayley Scales of Infant and Toddler Development* was administered to the children in the SECCYD (Child Care and Early Education Research Connections, 1999).

The Bayley Scale of Infant Development (BSID) is the most widely used measure of current developmental status for children in the first two years of life. The BSID is a commonly used standardized assessment of infant and toddler development that produces raw scores for both mental and psychomotor scales that can be either converted to standardized scores (mean = 100, standard deviation = 16) or used to determine the child's developmental age (Bayley, 1993). The BSID assesses the maturation abilities in cognitive and motor development of infants and toddlers between the ages of one and forty-two months of age. Raw scores are converted to standardized scores yielding a *Mental Developmental Index* score from the *Mental Scale* (internal consistency Cronbach's alpha = 0.88; test-retest reliability = 0.87; concurrent reliability = 0.62) and *Psychomotor Development Index* score from the *Motor Scale* (Cronbach's alpha = 0.84; test-retest reliability = 0.78; concurrent validity = 0.63). A *Behavior Rating Scale* (Cronbach's alpha = 0.88) provides context for obtaining the index scores. The Mental Index of the BSID has been correlated with several other well-known standardized development assessment tools including the McCarthy Scale of Children's Abilities (0.79); Weschler Preschool and Primary Scale of Intelligence-Revised, Full Scale IQ (0.73), the Verbal IQ, (0.73); and Performance IQ (0.63).

The BSID was first published in 1969. A revised edition was published in 1993, and a third edition in 2006. Because the collection of data for the SECCYD wave occurred both before and after the publication of the second edition of the BSID, the data for the 15 month old children were obtained using the BSID, and the data for the 24 month old children were obtained using the BSID second edition. The original version's scale was used at 15 months and the revised version was used at 24 months in the SECCYD as it allowed for extension of the age range of the scale beyond the original version's 30 months with a wider range of items to assess full range of performance possible among children at that age (Child Care and Early Education Research Connections, 1999). Changes to the BSID second edition, included the addition of color to the artwork, improvement of the quality of the materials, and the addition of new item types for assessing different abilities (Child Care and Early Education Research Connections, 1999).

Specifically, in the SECCYD, as well as this dissertation study, the estimates of current developmental status provided by the *Mental Index* of the BSID served as outcome measures indicating the child's level of cognitive development at 15 and 24 months. Chronological age was defined as the age of the child measured in months extrapolated from the child's birthdate. Ecological context was defined as any physical or relational issues that were involved in the occurrence of the unintentional injury, as identified by the respondent.

The parent or guardian of children participating in the SECCYD was asked via in-person or phone interviews, at specific points in time during that study, to report if their child had "seen or consulted with MD or other medical professional in the past month."

If “yes,” was reported, they were asked the reason why the child was seen and given specific options including “injury (or illness from poisoning).” Further specific questions related to the type, cause, and location of the injury were then asked.

Procedures

Secondary Data Analysis

The following data analysis utilizing the IBM SPSS Statistics for Windows (2012) was conducted to examine each of the following research questions associated with the study’s three specific aims:

RQ1: What are the characteristics of reported unintentional injuries (e.g., type of injury and severity) to children, ages 15, 24, and 36 months, in the child care setting and other settings?

Descriptive statistics, including frequency and proportions were used to examine type of injury, body part injured, location of injury occurrence, and severity of the injury. Frequency distributions and measures of dispersion were calculated for each of the variables.

RQ2: What portion of unintentional injuries to children ages 15, 24, and 36 months occur while in the CCC setting?

Descriptive counts of unintentional injuries that were reported to have occurred in a child care center versus no injury were used to derive a simple comparison of the number and percentages of total unintentional injuries to the number of unintentional injuries occurring at a CCC.

RQ3: What is the relationship between chronological age and mental development age in children ages 15, 24 and 36 months old who experience an unintentional injury while in CCCs?

For the subset of children who had an unintentional injury occur in a CCC, results of frequency distributions from Research Question 2 were used to determine if there was

equivalence between the developmental age and the chronological age as indicators of an unintentional injury occurring.

RQ4: Is a difference in mental development age and chronological age related to the occurrence of unintentional injuries in children, ages 15 and 24 months old, while in CCCs?

For the subset of children 15 and 24 months of age who had an unintentional injury occur in a CCC, chi-square analyses of 2 x 2 contingency tables were used to determine if there was an association between chronological age, mental development age and unintentional injury occurring in the CCC. Results of frequency distributions from research Question 2 were used to determine if there is equivalence between developmental age and chronological age as indicators of the occurrence of unintentional injuries.

RQ5: Are there differences in the characteristics of unintentional injuries that occur in CCCs and do not occur in CCC in children, ages 15 and 24 months old, and who have a development age that is different from their chronological age compared to the occurrence of unintentional injuries to children, ages 15 and 24 months old, who have a development age and chronological age that match?

For the subset of children 15 and 24 months of age who had an unintentional injury occur in a CCC, chi-square analyses of 2 x 2 contingency tables comparing children unintentionally injured in CCCs and children unintentionally injured in locations other than CCCs and children with mental development delay and with no mental development delay were used to determine if there was an association between reported unintentional injury occurrence in children with a different mental health age different from their chronological age.

RQ6: What are the characteristics (e.g., preparation of child care workers, ratio of child care workers to children, and age of children in unintentionally injured child's room) of the ecological context of CCCs that may be related to the child's development and the occurrence of unintentional injuries in children ages 15 – 36 months old in CCCs?

In the SECCYD, child care workers for each child participating in the study were asked a series of questions related to their educational backgrounds, knowledge of the child and work environment. For the subset of children ages 15, 24 and 36 months of age who had a reported unintentional injury while at a CCC, the answers to these questions were evaluated for descriptive statistics, including frequency and proportions, to determine components of the ecological environment of the CCC that relate to the child's development and unintentional injury occurrence.

Protection of Human Subjects

Approval of the dissertation study was obtained from the University of Michigan Internal Review Board-Health. Access to the restricted SECCYD data set was granted by the Interuniversity Consortium for Political and Social Research who holds the data.

Chapter 3

Results

The subsample for this study consisted of 1,313 children for whom gender was reported from the SECCYD data set. At specific points in time during the SECCYD study, each of these children's primary care providers (i.e., parent or guardian) was asked to report if the child had "seen or consulted with MD or other medical professional in the past month." If "yes," was reported, they were asked the reason why the child was seen and given specific options including "injury (or illness from poisoning)." Further specific questions related to the type, cause, and location of the injury were then asked. This criterion was used to determine the subset of unintentional injury results reported here.

Of the total 1,364 children in the SECCYD data set, there were 1,313 with information on the child's gender. Of the 1,313 children, 676 were males (51.5%) and 637 were females (48.5%). The total number of children who were reported to have experienced unintentional injuries was 183 with a mean of 0.14 per child, and a median of 0. The standard deviation was 0.393.

Numbers of unintentional injuries and distribution of unintentional injuries over time were determined by looking at three time points: 15 months of age, 24 months of age, and 36 months of age. Children who had an unintentional injury reported at one or more of those time points were identified, and then the total number of unintentional

injuries was determined. The minimum number of unintentional injuries reported for each child was 0, and the highest possible number of injuries, given the questionnaire restrictions, was 3. Of the 1,313 children 1,133 or 86.3% of the children had no unintentional injury reported. See Table 1 for a distribution of the total unintentional injuries reported for each child in the SECCYD data set.

Table 1: Distribution of the Total Number of Occurrences of Reported Unintentional Injury to Children in SECCYD Data Set

# times injured	Frequency	Percent
0	1,133	86.3
1	166	12.6
2	12	0.9
3	2	0.2
Total	1,313	100.0

The data from the SECCYD data set were further limited to include only those children who at the ages of 15, 24 and 36 months had a reported unintentional injury while at a CCC. Of the reported unintentional injuries at the ages of 15, 24 and/or 36 months only 8 (.006%) were reported to have occurred during childcare, (i.e., *home, center, or other's home*). Specifically, characteristics of unintentional injuries to children in CCCs ages 15, 24 and 36 months that were included were gender, number of injuries, characteristics of injury, and distribution of injuries over time.

RQ1: What are the characteristics of unintentional injuries (e.g., type of injury and severity) that occur to children ages 15, 24, and 36 months while in the CCC?

There was a total of 57 children 15 months of age whose primary care provider reported the occurrence of an unintentional injury. Two of these unintentional injuries were reported to occur at a CCC. Both of these unintentional injuries were specified as “cut, scrape or puncture.” At 24 months of age, there were a total of 70 children whose primary care provider reported the occurrence of an unintentional injury in the past month. Four of these were reported to occur at a CCC. One of these injuries was

specified as a “cut, scrape or puncture” and three of these injuries were specified as “undefined.” For the children at 36 months of age a total of 56 unintentional injuries were reported. Two injuries occurred at a CCC, and both were described as “cut, scrape or puncture.” Thus, of the 183 children with a reported unintentional injury in the SECCYD data set, eight (.043%) were reported to have an unintentional injury occurrence in a CCC during the ages of 15, 24 and 36 months. Table 2 shows the breakdown of selected specified types of unintentional injury by specific age and characteristic for children with a reported unintentional injury in a CCC. Tables 3 and 4 show the breakdown of injury occurrence in CCCs by gender.

Table 2: Distribution of the Total Number of Times of Reported Unintentional Injury to Children while in CCCs over 15, 24, and 36 Months of Age*

15 Months n=2	Broken bone	Sprain/strain	Cut, scrape, puncture	Head injury or concussion	Burn or scald	Other	Multiple	(Undefined)
Fall			1					
Other			1					
Total	0	0	2	0	0	0	0	0
24 Months n=4	Broken bone	Sprain/strain	Cut, scrape, puncture	Head injury or concussion	Burn or scald	Other	Multiple	(Undefined)
Fall								
Heat/fire			1					
Other								3
7 (undefined)								
Total	0	0	1	0	0	0	0	3
36 Months n=2	Broken bone	Sprain/strain	Cut, scrape, puncture	Head injury or concussion	Burn or scald	Other	Multiple	(Undefined)
7 (undefined)			2					
Total	0	0	2	0	0	0	0	0

**Note that there were many options for the mechanism of injury: animal bite, fall, heat/fire/electricity, toy or play equipment, plus some that were undefined. Only the categories with any injuries are presented here.*

Table 3: Distribution of Gender and Total Number of Reported Unintentional Injuries to Children while in CCCs over 15, 24, and 36 Months of Age

	Female	Male	Totals by Injury Occurrence
15 months of age	0	2	2
24 months of age	2	2	4
36 months of age	1	1	2
Totals by gender	3	5	8

Table 4: Distribution of Gender and Total Number of Reported Unintentional Injuries to Children not in CCCs over 15, 24, and 36 Months of Age

	Female	Male	Totals by Injury Occurrence
15 months of age	24	31	55
24 months of age	21	45	66
36 months of age	23	31	54
Totals by gender	68	107	175

RQ2: What proportion of unintentional injuries to children, ages 15, 24, and 36 months, occur while in the CCC setting?

To determine the proportion of unintentional injuries to children ages 15, 24, and 36 months occurring in the CCC setting, the data were specifically examined by injured/not injured and in CCC/not in CCC at each of the three ages. At 15 months of age, of the total sample of 1,313 children, 57 (4.34%) reported an unintentional injury. Two (3.50%) of these unintentional injuries were reported to have occurred at a CCC. Thus, of the 1,313 children total, 0.1523% were injured at a CCC. At 24 months of age, a total of 70 (5.33%) children had an unintentional injury reported. Of the 70 children with a reported injury, 4 (5.71%) were reportedly injured at a CCC. At 36 months of age, a total of 56 (4.26%) had a reported injury. Two (3.57%) were reported injured at a CCC. Of the 1,313 children total, 183 (13.93%) were reported to have an injury occurrence during the specified time period of 15, 24, and 36 months of age. Eight of these children (0.61%) were reportedly injured at a CCC. Table 5 shows the comparison data based on these parameters.

Table 5: Proportion of Injuries Reported Occurring at 15, 24, and 36 Months of Age

15 Months of Age			
	Injured	Not injured	Total
Not at CCC	55 (4.19%)	1,112 (84.69%)	1,167 (88.88%)
At CCC	2 (.15%)	144 (10.97%)	146 (11.12%)
total	57 (4.34%)	1,256 (95.66%)	1,313 (100.00%)
24 Months of Age			
	Injured	Not injured	Total
Not at CCC	66 (5.02%)	1,021 (77.76%)	1,087 (82.79%)
At CCC	4 (.31%)	222 (16.91%)	226 (17.21%)
total	70 (5.33%)	1,243 (94.67%)	1,313 (100.00%)
36 Months of Age			
	Injured	Not injured	Total
Not at CCC	54 (4.11%)	885 (67.40%)	939 (71.52%)
At CCC	2 (.15%)	372 (28.33%)	374 (28.48%)
total	56 (4.26%)	1,257 (95.73%)	1,313 (100.00%)

RQ3: What is the relationship between chronological age and mental development age in children, ages 15, 24 & 36 months old, who experience an unintentional injury while in CCCs?

To determine the relationship between chronological age and mental development age in children at ages 15, 24 and 36 months of age who experienced an unintentional injury at a CCC, BSID scores at 15 months of age and BSID-R scores at 24 months of age were compared with chronological age for each child who experienced an unintentional injury at a CCC at 15, 24 or 36 months of age (See Table 6). Of the eight children who had a reported unintentional injury at a CCC at 15, 24 or 36 months of age, none had a discrepancy between their chronologic and mental development ages at 15 months; seven of the eight children experienced a discrepancy between their chronologic and mental health ages at 24 months (one child had no mental health development score reported at this age). This was an unusually large, and improbable, number of children

with a discrepancy between chronological and mental health development scores.

Subsequently, an inquiry was made to one of the SECCYD primary investigators who informed the author that “beta” questions from the unpublished BSID-R had been used.

Thus, the *Mental Health Development* raw scores for the 24 month olds in the SECCYD data set were not normed with the *published BSID-R Estimated Development Age* table (personal communication, 2013). Subsequently, the publisher of the BSID-R was contacted to see if the unpublished *Estimated Development Age* table that was normed with the “beta” *Mental Health Development* raw scores was available. According to the publisher this table is not available.

Table 6: Comparison of Bayley Mental Health Scores and Chronological Age for Children with Reported Unintentional Injury at a CCC at 15 months, 24 months, or 36 months of Age

Age in months reported injured @ CCC	<i>Mental Developmental</i> raw score @ 15 months of age	<i>Mental Developmental</i> raw score @ 24 months of age	Matched @ 15 months of age? (<i>Estimated Developmental Age</i> based on MD raw score and chronological age the same)	*Matched @ 24 months of age? (<i>Estimated Developmental Age</i> based on MD raw score and chronological age the same)
15	112	94	Yes	No
15	112	104	Yes	No
24	98	90	Yes	No
24	101	82	Yes	No
24	no data	no data	no data	no data
24	116	108	Yes	No
36	97	93	Yes	No
36	121	104	Yes	No

*Based on comparison between *Mental Health Development* raw scores from the “beta” version of the *BSID-R* and the published *BSID-R Estimated Development Age* table.

RQ4: Is a difference in mental development age and chronological age related to the occurrence of unintentional injuries to children, ages 15 and 24 months old, while in CCCs?

To determine the relationship of chronological age and mental development age in children ages 15 and 24 months who experience an unintentional injury occurring in the CCC setting, the data were examined by looking at children who had a reported

unintentional injury occurring in the CCC, and their associated chronological and mental development age as determined by their raw score from the *Mental Development Index* of the *Bayley Scales of Infant Developmental* (BSID) and the *Bayley Scales of Infant Developmental-Revised* (BSID-R) at that chronological age. Raw scores from the BSID *Mental Development Index* were converted into *Estimated Developmental Age* (in months) using the conversion table in the *Manual for the Bayley Scales Infant Development-Revised* (1993) which provides an estimate of the infant's motor skills. These estimated development ages were then transformed into categorical data of development delay/no development delay and compared with unintentional injury occurrence/no unintentional injury occurrence. Thus, a "match" occurred between chronological age and mental development age if the child's *Bayley Estimated Developmental Age* was at or above the expected level for that age. Conversely, "no match" occurred between chronological age and mental development age if the child's *Bayley Estimated Developmental Age* was below the expected level for that age. This measure of whether they "matched" was done separately for the 15 month scores and the 24 month scores (see discussion of comparison of BSID and BSID-R in Methods chapter).

15 months of age

A total of 57 children from the sample of 1,313 was reported as having had an injury at 15 months old. Only two of these unintentional injuries were reported to have occurred at a CCC. Both of these children had a chronological age and mental development age that "matched" at 15 months of age. A 2 x 2 contingency table (See Table 7) was set up to perform a chi-square analysis to test if there was an association

between the variables in the rows (match/no match based on *Bayley Estimated Developmental Age* and chronological age) and columns (injured, not at CCC/injured at CCC). Because data in two of the cells had an expected value of less than 5, a Fischer's Exact Test was utilized to account for the small number associated with one of the columns. The results (See Table 8) were not significant ($p > 0.5$) indicating no association in this sample between being injured and no match between the *Bayley Estimated Developmental Age* chronological age, whether at a CCC or not at a CCC.

Table 7: Chi-Square Utilizing Fischer's Exact Test for Associations between Matched and Not Matched Development Age Versus Injury Not at CCC and Injury at CCC at 15 Months of Age

	Injured, but not @ CCC @ 15 months of age	Injured @ CCC @ 15 months of age	Total
<i>Estimated Developmental Age</i> and Chronological Age "match"	44	2	13
<i>Estimated Developmental Age</i> and Chronological Age "no match"	11	0	44
Total	55	2	57

Table 8: Chi-Square Utilizing Fischer's Exact Test for Associations between Matched and Not Matched Development Age Versus CCC injury and No Injury at CCC at 15 Months of Age

Asymptotic Significance (2-sided)	Exact Significance (2-sided)	Exact Significance (1-sided)
.481	1.000	.648

24 months of age

A total of 70 children from the sample of 1,313 was reported to have had an injury at 24 months old. Only four of these unintentional injuries were reported to have occurred at a CCC. All of these children had a chronological age and mental development age that was "mis-matched" at 24 months of age. A 2 x 2 contingency table (See Table 9) was set up to perform a chi-square test to test if there was an association between the variables in the rows and columns. Because data in the level of the match between Bayley and chronological age had zero observations, the assumptions necessary to perform a

statistically sound chi-square test with and without using the Fischer's Exact Test were violated. Thus, making the determination of association for the 24 month olds in this sample was not feasible, and no substantive conclusion supported by statistical significance about the association could be drawn (See discussion of "beta" raw scores above in *Research Question 3*). From observation of the information in this table, a tentative conclusion could be drawn that if a child has mismatched chronological and BSID-R Mental Index scores at the age of 24 months, they are likely to be injured at a CCC. But, due to the methodological issues with the use of "beta" test questions comparison with the published standardized table of *Estimated Developmental Age*, this hypothesis cannot be made with any confidence.

Table 9: Contingency Table of Matched and Not Matched Development Age Versus Injury Not at CCC and Injury at CCC at 24 Months of Age

	Injured, but not @ CCC @ 24 months of age	Injured @ CCC @ 24 months of age	Total
<i>Estimated Developmental Age and Chronological Age "match"</i>	0	0	0
<i>Estimated Developmental Age and Chronological Age "no match"</i>	66	4	70
Total	66	4	70

*Based on comparison between *Mental Health Development* raw scores from the "beta" version of the *BSID-R* and the published *BSID-R Estimated Development Age* table.

Research Question 5: Are there differences in the characteristics of unintentional injuries that occur in CCCs and do not occur in CCC in children, ages 15 and 24 months old, in CCCs and who have a development age that is different from their chronological age compared to the occurrence of unintentional injuries to children, ages 15 and 24 months old, who have a development age and chronological age that match?

To determine if there were differences in the characteristics of unintentional injuries in children ages 15 and 24 months old in CCCs with a development age that is different from their chronological age compared to children ages 15 and 24 months of age in CCCs whose chronological age and development age match, the match or no match of their BSID scores and chronological age at 15 and 24 months of age were compared to the match or no match of the BSID scores and chronological age of children at 15 and 24 months of age children with a reported injury occurrence at some location other than a CCC.

For 15 month old children, if the BSID *Mental Development Index* score was at 97 or below, the child was defined as not having a "match" between mental and chronological ages. This was based on the BSID table determining the scores and interpretation for mental development age (See Appendix 1). There were 990 children with Bayley scores at both 15 and 24 months. Using SPSS, a variable was created that identified whether the cognitive scores and chronological ages matched (note that children with a cognitive age higher than their chronological age were still defined as "match" for this study). Thus, one variable for 15 months and one variable for 24 months were created. Then it was determined from the previous data sets whether the child was injured at 15 months at a CCC or not. Table 10 displays the resulting descriptive statistics which show that 20.9% of the children had a "no match", (i.e., mis-match) between cognitive age and chronological age. That is, 207 children had a mental scale score of 97 or lower. The remaining 783 children (79.1%) had a "match".

Table 10: Match or No Match Between *Bayley Estimated Developmental Age* and Chronological Age at 15 Months

	Frequency	Percent
No Match – <i>Bayley Estimated Developmental Age</i> less than chronological age	207	20.9
Match - <i>Bayley Estimated Developmental Age</i> equal or greater than chronological age	783	79.1
Total	990	100.0

For the comparison of injuries at a CCC at 15 months, there was one child who was injured at a CCC but did not have a BSID score for 15 months. That observation was not included for this analysis. A 2 x 2 contingency table was set up for comparison of the two groups at 15 months of age (See Table 11).

Table 11: Comparison of Match and No Match of *Bayley Estimated Developmental Age* and Chronological Age to Not Injured at CCC and Injured at CCC at 15 Months of Age

	Not injured @ CCC @ 15 months of age	Injured at CCC @ 15 months of age	Total
<i>Estimated Developmental Age</i> and Chronological Age “ match ”	782	1	783
<i>Estimated Developmental Age</i> and Chronological Age “ no match ”	207	0	207
Total	989	1	990

For 24 month old* children, if the BSID-R *Mental Development Index* raw score was at 131 or below, the child was defined as not having a "match" between mental and chronological ages. This was based on the BSID-R table determining the scores and interpretation for mental development age. For the comparison of injuries at a CCC at 24 months, a 2 x 2 contingency table was set up for comparison of the two groups at 24 months of age (See Tables 12 and 13).

Table 12: Match or No Match Between Mental Bayley Estimated Developmental Age and Chronological Age at 24 Months of Age[^]

*For 24 month old children, if the Bayley mental scale score was 131 or lower, the child was defined as not having a "match".	Frequency	Percent
No Match – Bayley Estimated Developmental Age less than chronological age	989	99.9
Match - Bayley Estimated Developmental Age equal or greater than chronological age	1	.1
Total	990	100.0

[^]Based on comparison between *Mental Health Development* raw scores from the “beta” version of the *BSID-R* and the published *BSID-R Estimated Development Age* table.

Table 13: Comparison of Match and No Match of Bayley Estimated Developmental Age and Chronological Age to Injured at CCC with not Injured at CCC at 24 months of Age

	Not injured @ CCC	Injured @ CCC	Total
<i>Estimated Developmental Age and Chronological Age “match”</i>	1	0	1
<i>Estimated Developmental Age and Chronological Age “no match”</i>	985	4	989
Total	986	4	990

*Based on comparison between *Mental Health Development* raw scores from the “beta” version of the *BSID-R* and the published *BSID-R Estimated Development Age* table.

Research Question 6: What are the characteristics (e.g., preparation of child care workers, ratio of child care workers to children, and age of children in unintentionally injured child’s room) of the ecological context of CCCs that may be related to the child’s development and occurrence of unintentional injuries to children, ages 15-36 months old, while in CCCs?

The observations and experiences of the CCC directors of the eight children with a reported unintentional injury at a CCC at 15, 24 or 36 months of age were obtained by SECCYD researchers through phone interviews at the respective time times throughout the SECCYD study. Appendix 1 provides a list of all questions and child care worker responses.

The same series of questions were asked of child care workers of children ages 15 and 36 months with an unintentional injury occurrence while at a child care center. A different question set, focusing more specifically on development, was asked of the child workers when the children were at 24 months of age. There were two children with an injury at a CCC in the 15 month old age group. Only one child care worker answered any of these questions. There were four children with an injury at a CCC in the 24 month old age group. Only three child care workers answered any of these questions. There were two children with an injury at a CCC in the 24 month old age group. Only one child care worker answered any of these questions.

For the purposes of this dissertation study, the responses of the CCC directors for the eight children who were reported to have experienced an unintentional injury in a CCC were identified and reviewed for dominant themes in relation to the ecological context of unintentional injury occurrence, specifically as it relates to unintentional injuries and development in CCC, and generally as it relates to Bronfenbrenner's Ecological Theory. Table 14 provides a summary of the child care worker's responses that specifically relate to an injured child and the child care worker's knowledge of development. A complete discussion of the results is presented in Chapter 4.

Table 14: Summary of Child Care Workers' Responses Related to Development

Responses	Questions					
	# of children in the target child's room?	Ages of children in the room with the target child?	How long have you been caring for this child?	Mark all areas you have had training in.	Any training specific to the care of infants under 18 months of age?	What areas would it be useful to receive further training?
Child's Age						
15 months ($n = 1$)	9	Not asked	1 month	Cognitive development	No	Emotional development, health and safety
24 months ($n = 3$)	8, 13, 15	There was one room with one infant less than 12 months. One room with had three children 12-18 months. One had one child 19-24 months, and one had two children 19-24 months. Two rooms had 7 children 25-36 months, while the other had 15 children in that range.	1 month, 4 months, 13 months	cognitive development: 3 emotional development: 3 physical development: 3 planning curriculum: 2 health and safety: 3 discipline: 2		Cognitive development: 1 emotional development: 1 physical development: 1 health and safety: 1 discipline: 1
36 months ($n = 1$)	Not asked	Not asked	1 month	Cognitive, Emotional, Physical Development	Not asked	Cognitive Development, health and safety

Chapter 4

Discussion of Findings

The results are discussed in the sequence of the specific aims and in terms of the conclusions drawn from the research questions associated with each specific aim in the context of the extant literature. Possible theoretical and clinical implications of significant findings as well as potential explanations for unsupported hypotheses are explored in terms of study limitations. Finally, recommendations for future research in this area will be addressed.

Descriptive data results from this dissertation study are consistent with previous studies (Briss et al., 1994; Sacks et al. 1989) describing the occurrence of unintentional injuries to children in CCCs. In this dissertation study the portion of unintentional injuries reported to occur at 15, 24 or 36 months of age is small (4.34%, 5.33%, and 4.26% respectively). Only eight reported unintentional injury occurrences were reported for children at either 15, 24, or 36 months of age while at a CCC. The majority of these injuries (50%) occurred to children 24 months of age, which is consistent with previous research (Lee & Bass, 1990; Ponka, Salminen, & Ponka, 1989; Sacks et al., 1989) showing that toddlers are more likely to have unintentional injury occurrence compared to other age categories of children (e.g., infants and pre-schoolers).

Five of these unintentional injuries were specified as “cut, scrape or puncture.” Three of these were specified as “undefined.” All eight of the unintentional injuries that were reported to have occurred in a CCC, also required treatment by a physician. The fact that less than 1% of the children ages 15-36 months of age experienced an unintentional injury while at a child care center leads to the general conclusion that, in terms of severity, there were very few reported unintentional injuries of a severe nature. Also, a smaller proportion of children at CCCs experienced an unintentional injury compared to those children not in CCCs. Numerous studies have shown that large numbers of American children spend time in child care settings where they are at potential risk of unintentional injury occurrence (Alkon, Ragland, Tschann, Genervro, Kaiser, & Boyce, 2000; Aronson, 1983; Chang, Lugg, & Nebedum, 1989; Davis & McCarthy, 1988; Elardo, Solomons, & Snider, 1987; Landman & Landman, 1987; Ponka, Salminen, & Ponka, 1989; Rivara, 1987; Sack, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Solomons, Lakin, Snider, & Paredes-Rojas, 1982; Shwebel, Brezaussek & Belsky, 2006). However, there are no current statistics on the actual number of children unintentionally injured in U.S. CCCs. Older studies in this area (Briss et al., 1994; Davis & McCarthy, 1988; Elardo, Solomons, & Snider, 1987; Landman & Landman, 1987; Ponka, Salminen, & Ponka, 1989; Rivara, 1987; Sack, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Solomons, Lakin, Snider, & Paredes-Rojas 1982). These early studies (Aronson, 1983; Chang, Lugg, & Nebedum, 1989; Davis & McCarthy, 1988; Elardo, Solomons, & Snider, 1987; Landman & Landman, 1987; Ponka, Salminen, & Ponka, 1989; Rivara, 1987; Sack, Smith, Kaplan, Lambert, Sattin, & Sikes, 1989; Sack, 1989; Solomons, Lakin, Snider, & Paredes-Rojas 1982) have demonstrated a relatively low unintentional injury

rate occurrence in CCCs. The findings of the current study were consistent with those studies. However, since the SECCYD only obtained data about unintentional injuries serious enough to require seeing a physician, it is unknown if there were more occurrences of unintentional injuries in CCC that were less severe in nature. This leads to an on-going discussion in the injury research community of how to most accurately and reliably define the type of unintentional injuries in research studies. For example, in the SECCYD data set, by characterizing the severity of injury only in terms of needing to be seen by a physician, there is the possibility that more injuries of a less severe, though still significant, nature to have not been reported occurring at CCCs. There is ongoing discussion in the injury research community as to the need for better, more specific definitions of injuries in general and unintentional injuries specifically, so that the most accurate and reliable definitions of the type and incidence of unintentional injuries in research studies can be known (CDC, 2013; Emory Center for Injury Control, 2013; STIPDA: Injury Surveillance Workgroup 5, 2013).

Less severe unintentional injuries still have the potential for significant impacts on the children's and parent's daily lives in terms of factors such as parents' time off work, days of missed child care requiring use of other child care providers, as well as relationships between injured children and other children and child care workers in the child care setting. This leads to the conclusion that injuries that occur to children of this age in CCCs have a significant role to play in policy and injury prevention. Further, these are all potentially significant outcomes that need to be further explored in future studies. Further, these are all potentially significant outcomes that could be further explored in future studies. Also, this highlights the on-going discussion in unintentional

injury research as to the lack of a standard definition of unintentional injuries. There is significant variation in how unintentional injuries are defined and that leads to difficulty in describing the type of unintentional injury.

In terms of the association between development and the occurrence of unintentional injuries to children ages 15-36 months old, based on the results of this dissertation study, no statistically significant conclusions can be drawn from the data used in these analyses. There were no differences in the occurrence of unintentional injuries in children ages 15 and 24 months old in CCCs with mental development age that is different from their chronological age compared to children ages 15 and 24 months old in CCCs whose chronological and development match. Although an interpretation of the data can lend itself to a tentative conclusion that if a child has mismatched chronological and BSID-R Mental Index scores at the age of 24 months, they are very likely to be injured at a CCC. However, due to the methodological issues with the use of “beta” test questions comparison with the published standardized table of *Estimated Developmental Age*, this hypothesis cannot be made with any confidence.

Of the eight children who were reported to have an unintentional injury occurrence at a CCC, there were only responses documented from five of the respectively associated CCC workers. Such a low proportion of responses do not lend itself to the conclusion of determining significant themes in relation to the ecological context of unintentional injury occurrence in child care centers. However, it does provide data to be used for comparison in future studies.

The questions from the SECCYD data set for CCC workers regarding the environment of the CCC of the children with reported injuries, are focused exclusively on

obtaining information at the microsystems (i.e., the setting and intrapersonal behaviors) level of the ecological context. CCC workers of children 15 and 24 months of age, with a reported unintentional injury at CCC, reported being responsible for a range of 9 to 15 children in each room. Further, there was variation in the children's ages from 12 to 36 months that the CCC workers were responsible for. Both of these findings suggest that the CCC workers need knowledge of development that extends from late infancy through toddlerhood. Further, all five of the CCC workers responding to questions specifically indicated that further knowledge of health and safety as well as cognitive development would be useful. Most of the child care workers reported caring for the children who were injured at a CCC for one month. These findings suggest that there are several specific areas related to unintentional injury occurrence in the CCC microsystem that can be targeted for injury prevention strategies.

Further research needs to be done to delineate what areas of the CCC ecological context in terms of the exosystem, mesosystem, and macrosystem could also have an impact on unintentional injury occurrence and prevention strategies. It is interesting to note that one specific injury prevention model has been put forth by Hanson et al. (2005), explicates the ecological microsystem in terms of behavior, biological, and psychological intrapersonal as being only the *tip of the iceberg of planning sustainable safety interventions* (p. 6). Further research specifically looking in more detail at applying Hanson et al.'s (2005) model incorporating various levels of the ecological context (e.g., CCC and state safety policies) may be one way to increase knowledge of the ecological context of injury occurrence in CCCs in future studies.

Study Limitations

Methodological Issues:

There were numerous methodological issues with this study related to the use of the secondary data set and its analysis. These issues will be discussed in relationship to this dissertation study as well as the implications for future research.

The SECCYD study only obtained data about unintentional injuries serious enough to require seeing a physician. It is unknown to what extent there were injuries in CCCs that were less severe in nature. Defining the parameter for reportable injuries is an ongoing issue in unintentional injury related research (Gielen, Sleet & DiClemente, 2006; Khambalia, 2006). Due to the nature of unintentional injuries, it is unlikely that significantly large numbers will occur in one place and over a limited time period to provide a sufficient number of incidents to achieve statistical significance in analyses such as those conducted. One way to address this specifically in CCCs in future research is to include not only injuries significant enough to be seen by a health care provider, but all injuries that are documented by incident reports. This approach could significantly increase the number of injuries in relation to occurrence at CCC so that statistical analysis based on regression analysis, for example, where one can control for more variables that potentially have an impact on the injury occurrence. By controlling for these variables the role of specific factors of the ecological context in the occurrence of unintentional injuries in CCCs could be more clearly explicated.

The fact that there are groups of children in CCCs provides an important opportunity for further and more precise study of the ecological context of unintentional injuries in children in CCCs. Studies that specifically look in greater detail at defining

the already identified and further unidentified ecological variables and their relationships would allow for the further clarification of the role of the ecological context, and factors associated with it that might be manipulated to decrease unintentional injuries.

Although there was no demonstration of any statistically significant association between developmental concerns, as measured by a difference in developmental and chronological ages and the occurrence of unintentional injury to children 15-36 months of age in CCC settings, the numerous methodological issues associated with the data set in this study are worth exploring in relation to these outcomes. First, the lack of ability to specifically tie the date of unintentional injury occurrence with the chronologic age means that there was not a tight fit between the two variables, allowing for the possibility of extraneous uncontrolled variables to be influential on the variables of unintentional injuries and chronologic age. The use of only the *Mental Index BSID-R* scores also negates any influence the motor portion of development may or may not have on the occurrence of unintentional injuries to children at these ages in CCCs. Development does not occur in an isolated way. Obtaining complete developmental screenings that include aspects of cognitive, motor, language, and social development may hold the key to determining if a child is at risk for unintentional injury occurrence at any age. Perhaps health care providers should include a complete developmental screening when treating children for unintentional injuries to further delineate the role that development plays in unintentional injury occurrence in CCCs (and other locations). Also, the small number of reported injury occurrences made it impossible to detect any statistically significant relationships among the variables of chronological age, development and unintentional injury occurrence to children in CCCs.

There is continued interest in injury research specific to this area as demonstrated by the CDC's - National Center for Injury Prevention and Control's currently calling for epidemiological studies that describe the type, setting, and risk factors of injuries to children in CCCs (CDC, 2011; CDC, 2012). Future research studies need to limit the amount of recall bias as well as the low unintentional injury incidence in child care centers by using different parameters to define unintentional injury. One specific way of doing this would be to look at incident reports of all unintentional injuries (not just those requiring medical treatment) that occur in a CCC and to perform a complete developmental screenings on the injured and uninjured children. Also, there are numerous challenges with gaining access to children via child care centers as experienced by this author who initially designed this study to obtain primary data, as described above, from child care centers. After contacting over 40 child care centers from one geographic region, only one was willing to even ask their parents to see if they were interested in participating in the study. Although many CCCs expressed an initial interest in the need for the study, when they determined that participating in the study involved even a relatively small amount of time of the parents and CCC workers, the CCCs declined to participate. Thus, any future research in this area has to address the issue of feasibility as it relates to gaining access to this population in a manner that is acceptable to both parents and CCC workers.

The issue of unintentional injuries to children in CCCs has significance to pediatric health care providers in all areas of health from primary to tertiary care. With their expertise and knowledge of children, health promotion, and community interventions, pediatric health care providers are prime candidates to be active proponents

in the prevention and reduction of injuries to children, cutting across all sectors of the health care system. Further, they can provide primary, secondary, and tertiary levels of unintentional injury preventions and interventions in multiple health care settings.

Ultimately, pediatric health care providers' abilities to promote prevention of injuries to children in CCCs are dependent on their knowledge of the policies, behaviors, and environments that impact such injury occurrences and prevention strategies (Christoffel & Gallagher, 2005; Tanz, 2008). To facilitate the development of effective injury prevention strategies clinicians need to have a better understanding of children who can be identified as "at risk" for injury occurrence in CCCs. Much of the research surrounding unintentional injuries identifies children as "at risk" based on their chronological age or a discrete personality characteristic such as temperament or aggressive behavior. Yet, pediatric health care providers spend much of their time identifying and addressing issues related to children's health based on the interaction of components of social, behavioral, physical and motor skills and the environment, knowing that the chronological age of a child may or may not correlate with their developmental age. It is known that the age range for normal development of specific types of developmental skills is wide (e.g., running with coordination can occur anywhere between 14 and 25 months of age; normal capability of speaking in a way understandable to a stranger can occur between 36 and 48 months of age) (Levine, Carey & Crocker, 1999). Yet, children are often grouped by age in CCCs and injury research focuses on children primarily by the age of each child versus the development level of each child. Consequently, studying injury occurrence with the independent variable of

age and not developmental level may lead to erroneous generalizations about the nature of injury occurrence in CCCs.

Review of the research pertaining to injuries to children in CCCs showed that research in this area does not fit into a clinical behavioral perspective, but instead, much of the research flows from the perspective of epidemiology. Incorporated in the epidemiologic perspective is the inclusion of age as part of basic demographic variables, and discrete parts of development (i.e., affective and personality traits). However, a framework incorporating the ecological framework and the clinical development perspective (affective, cognitive, motor, and physical [including chronic illness and age]) potentially has benefits for further efforts to reduce unintentional injuries and improve unintentional injury prevention (Gielen, Sleet, & DiClemente, 2006).

The numerous practical and methodological issues associated with research on unintentional injury occurrence in child care centers suggests that future research in this area would be best obtained with a shift in focus from child care centers to unintentional injury occurrence to children in other settings where there is a higher incidence rate of unintentional injury occurrence, and there is ability to contact parents directly about their child's development without having to go through the child care center. One specific area could be in rehabilitation centers which would also facilitate collaboration between acute and primary health care providers in researching and developing more effective methods of identifying unintentional injuries and their relationship to children's development and the ecological context of unintentional injury occurrence.

Chapter 5

Summary of Study

The purpose of this descriptive-exploratory longitudinal study was to investigate the role of developmental factors and the ecological context in the occurrence of unintentional injuries to children that occurred in child care centers (CCCs) ages 15 through 36 months old. The study was a secondary analysis of a national data set from the Study of Early Child Care and Youth Development (SECCYD).

The large numbers of children who have the potential for unintentional injury make investigation of this specific child care issue important due to the potential economic and social costs in terms of lost work hours of parents, associated health care costs, and loss of potential life years. Also, one of the goals of Healthy People 2020 is, “Prevent unintentional injuries and violence and reduce their consequences” (U.S. Department of Health and Human Services, 2012, Injury and Violence Prevention Goal). Improving the understanding of the variables involved in unintentional injuries which can happen to children can lead to improved understanding and development of unintentional injury prevention activities (Gielen, Sleet & DiClemente, 2006; NAPNAP Position Statement, 2008; Tanz, 2008).

The low occurrence of reported unintentional injuries in CCCs to children ages 15, 24 and 36 months resulted in a very small sample and no significant statistical conclusions could be made. However, the low occurrence is consistent with numerous

previous studies that have found relatively low incident rates of unintentional injury occurrence in CCCs, especially when compared to the unintentional injury rates of children who are not in CCCs (Schwebel, 2006; 2007). The low rate of unintentional injury occurrence in CCCs found in this study and others (see for example, Rivara, DiGuseppi, Thompson, & Calonge, 1989; Thacker, Addiss, Goodman, Holloway, Harrison, & Spencer, 1992) raises the question of, “Why?” Are there such inconsistent definitions of unintentional injuries and how they are reported that we cannot accurately gauge the true numbers of unintentional injury occurrence as suggested by the lack of consistent reporting from states (Currie, 2004)? Have injury prevention strategies already in place in CCCs achieved the goal of decreasing injury rates to their lowest possible levels? In either case, the CDC continues to call for further research into unintentional injury occurrence (CDC, 2013).

Thus, there appears to be a need for additional epidemiological studies in this area to accurately determine the incidence of all unintentional injuries in CCCs. A second focus that warrants additional research is “What is it about CCCs that explains the lower incidence rates in these settings? If effective injury prevention strategies being used in CCCs are identified, can these strategies and results be replicated in other settings to significantly decrease unintentional injury occurrence?

Descriptive data drawn from this study pertaining to injury occurrence in CCCs as well as specific aspects of the ecological environment of CCCs may be used as a starting point in designing future research related to this topic. Grouping children together in CCCs by chronological age without taking into account possible, if not likely, developmental variations, may be a significant way in which we are missing

opportunities to prevent unintentional injury occurrence for toddlers in CCCs. If groups of children with different developmental capabilities and or expectations by child care center workers are being placed together for long periods of time does that increase the risk of unintentional injuries occurrence and/or the severity of injury?

A future study that focuses on obtaining specific details of unintentional injury occurrence in CCCs, then looks at the complete development of the children who were and were not injured as well as the ecological factors of the specific CCCs where the injuries occurred could provide better knowledge and understanding of the relationship of these important variables in pediatric unintentional injury occurrence and result in better prevention strategies being developed. Such a study could be conducted by identifying, through incident reports at CCCs, children within a day or two of unintentional injury occurrence at a CCC. Then, a developmental screening that looks at all aspects of development could be performed on that child within a short time frame from the reported injury occurrence to get a more accurate comparison of developmental and chronological age. Also, an interview of the CCC worker who witnessed the injury could identify specific ecological components of the setting in which the unintentional injury occurred. However, the participation of the CCCs and workers would need to be obtained up front to ensure adequate numbers of participants.

As noted in the literature review, most of what is known about injuries to children is based upon descriptive epidemiologic research and in terms of discrete aspects of children's development and in terms of proxies such as age and gender. Although this research gives us a snapshot as to the types of unintentional injuries and the types of children they occur to, this snapshot lacks clarity and detail about the developmental

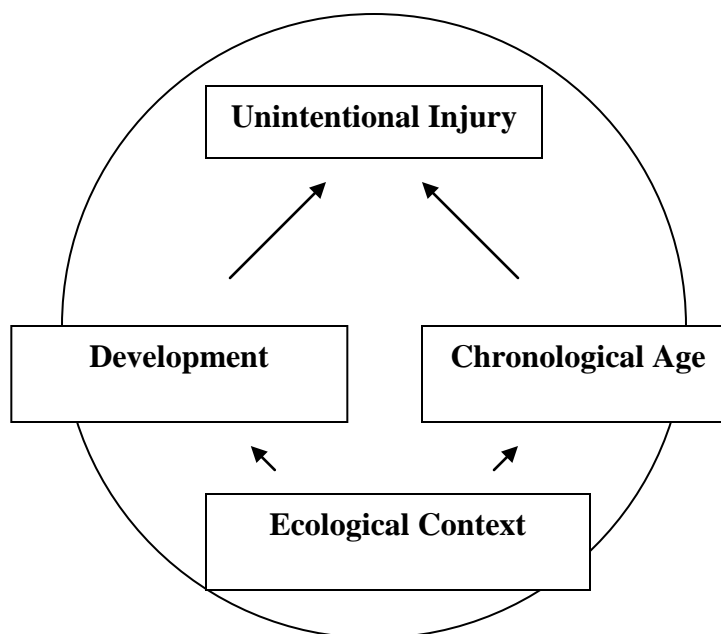
details in terms of behaviors, motivations, and competencies which ultimately contribute to, if not cause, injuries. Also, in terms of the ecological context of unintentional injury occurrence the research literature focuses on identifying specific environmental and personal factors that increase the chance of unintentional injury occurring to a child as opposed to the relationships and interactions of these factors. There is a need for research pertaining to unintentional injuries in child care centers that specifically looks at or acknowledges the relationships among the developmental factors, environmental factors, and the larger ecological context surrounding these factors.

In conclusion, there is a need for investigation into the occurrence of unintentional injuries that has an ecological focus that combines both developmental and epidemiological emphases on the interaction between child development, particularly of toddlers (15-36 months of age), and the broader ecological context of injuries. To facilitate such a program of research, this author proposes that there must be better identification of and better understanding of the basic independent developmental and environmental variables associated with unintentional injuries, and these variables' discrete predictive ability of unintentional injuries. There also needs to be further identification and understanding of the significant components of the ecological context of unintentional injuries that occur to children in CCCs.

Most of the current research in this area is descriptive and focuses on identification of discrete independent variables directly associated with unintentional injuries (e.g., children with aggressive personalities have increased occurrence of unintentional injuries). However, just as development is not the result of discrete, isolated aspects of the child, injury-related developmental factors may not occur as

discrete, isolated independent variables. Research should be undertaken to not only identify injury-related developmental variables but also to identify their potential occurrence as interactive variables within the child. Furthermore, injury research currently focuses on a direct cause and effect relationship between independent and dependent variables (i.e., falls from playground equipment by three-year-old children results in injury) when the reality is that there are numerous factors occurring and interacting that result in injury (e.g., the child care center's policies on supervision and playground equipment, the parents' and peers' influence on the child, the child's physical growth and cognitive understanding) and the qualitative aspects of that injury.

Figure 1

Conceptual Framework for Dissertation Study

Appendix 1

Responses from CCC Workers of Children with Reported Unintentional Injury Occurrence at their CCC

at 15 Months of Age. ($n = 1$)

Question: How long have you been caring for this child? (in months)

Response: one month.

Question: In a typical week, how many days do you provide care for this child?

Response: five days.

Question: On a typical day, how many hours do you provide care for this child?

Response: ten hours.

Question: Are you specifically assigned to this child, or is he/she part of a group?

Response: he answer was the target child was part of a group of nine children.

Question: How many other adults at this center provide care for the target child on a typical day?

Response: The answer was four other adults.

Question: How many years have you worked in the field of child care?

Response: three years.

Question: How long have you worked at this center?

Response: less than one year.

Question: If caregiver has had experience in child care prior to working at this center, indicate previous experience:

Response: other child care center, elementary school.

Question: Was any of your experience specifically with infants under 18 months?

Response: no.

Question: Do you belong to any professional child care organization?

Response: no.

Question: What is the highest educational level you have completed?

Response: four-year degree.

Question: If you have a college degree, what area is it in?

Response: early childhood education.

Question: Do you have a certificate in early childhood education or child care?

Response: no.

Question: What is the certificate/credential?

Response: N/A

Question: Have you ever had specialized training early childhood education or child care?

Response: no.

Question: Where did you receive this training?

Response: N/A

Question: Mark all areas you have had training in.

Response: cognitive development, planning curriculum, and program administration.

Question: Was any of this training required by the State or your employer?

Response: not required by the state, but yes required by employer.

Question: Was any of this training within the past year?

Response: no.

Question: What was the topic of this training?

Response: N/A

Question: Was any of this training specific to the care of infants under 18 mo?

Response: N/A

Question: In what areas would it be useful to receive further training?

Response: The answer was emotional development, and health and safety.

at 24 months of Age ($n = 3$)

Question: How many paid child care staff... provide care with this child's group/room?

Response: One said two others, one said three, and one said five.

Question: How many staff left the program since the child entered?

Response: zero, one, and two.

Question: How many new staff have started since the child entered?

Response: zero (1) and two new staff (2).

Question: How many other children are in the room with the target child?

Response: 8 children, 13 children, and 15 children.

Question: What are their ages?

Response: There was one room with one infant less than 12 months. One room with had three children 12-18 months. One had one child 19-24 months, and one had two children 19-24 months. Two rooms had 7 children 25-36 months, while the other had 15 children in that range.

Question: What is the maximum number of children in the room with the target child?

Response: 6 children, 12 children, and 15 children.

Question: How long have you been caring for this child? (in months)

Response: 1 month, 4 months, 13 months.

Question: In a typical week, how many days do you provide care for this child?

Response: 3 days per week (1) and 5 days per week (2).

Question: On a typical day, how many hours do you provide care for this child?

Response: 8 hours, 8 hours, 8 hours.

Question: Are you specifically assigned to this child, or is he/she part of a group?

Response: Two answered that the target child was part of a group. One was specifically assigned to the target child. When asked the follow-up question about the size of the group, the two who cared for a group answered, with one indicating 6 children and the other indicating 12.

Question: How many other adults at this center provide care for the target child on a typical day?

Response: All three answered two other adults.

Question: How many years have you worked in the field of child care?

Response: three years, seven years, eight years.

Question: How long have you worked at this center?

Response: Three answers: four years, seven years, eight years.

Question: If caregiver has had experience in child care prior to working at this center, indicate previous experience:

Response: There were no answers to this question.

Question: Do you belong to any professional child care organization?

Response: Two said no, one said yes.

Question: What is the highest educational level you have completed?

Response: One answered a high school diploma. The other two had some college but no degree.

Question: If you have a college degree, what area is it in?

Response: Although this question SHOULD have had no answer, since none of them had a degree, one person said "early childhood education" and one said "elementary education."

Question: Do you have a certificate in early childhood education or child care?

Response: We had one person of the three who answered say yes.

Question: What is the certificate/credential?

Response: Certificate in early childhood education

Question: Have you ever had specialized training early childhood education or child care?

Response: Two people said yes. One did not answer.

Question: Where did you receive this training?

Response: Two said at a conference, one said in-service training.

Question: Mark all areas you have had training in.

Response: cognitive development: 3

emotional development: 3

physical development: 3

planning curriculum: 2

working with parents: 1

health and safety: 3

discipline: 2

working with staff: 2

program administration: 1

Question: Was any of this training required by the State or your employer?

Response: Two said the training was required by the state, two said it was required by employer.

Question: Was any of this training within the past year?

Response: All three who answered said yes.

Question: What was the topic of this training?

Response: Cognitive development: 2

emotional development: 3

physical development: 1

planning curriculum: 2

working with parents: 1

health and safety: 3

discipline: 1

working with staff: 1

Question: In what areas would it be useful to receive further training?

Response: Cognitive development: 1

emotional development: 1

physical development: 1

planning curriculum: 2

working with parents: 2

health and safety: 1

discipline: 1

working with staff: 1

at 36 months of age ($n = 1$)

Question: How long have you been caring for this child? (in months)

Response: 1 month

Question: In a typical week, how many days do you provide care for this child?

Response: 2 days per week

Question: On a typical day, how many hours do you provide care for this child?

Response: 8 hours.

Question: Are you specifically assigned to this child, or is he/she part of a group?

Response: part of a group

Question: How many other adults at this center provide care for the target child on a typical day?

Response: Two other adults

Question: How many years have you worked in the field of child care?

Response: three years

Question: How long have you worked at this center?

Response: Less than one year

Question: If caregiver has had experience in child care prior to working at this center, indicate previous experience:

Response: Yes, "other setting"

Question: Do you belong to any professional child care organization?

Response: Yes.

Question: What is the highest educational level you have completed?

Response: 4 year degree

Question: If you have a college degree, what area is it in?

Response: early childhood education

Question: Do you have a certificate in early childhood education or child care?

Response: yes

Question: What is the certificate/credential?

Response: Certificate in early childhood education

Question: Have you ever had specialized training early childhood education or child care?

Response: No answers to this question

Question: Where did you receive this training?

Response: No answers to this question

Question: Mark all areas you have had training in.

Response: Cognitive development, emotional development, physical development, planning curriculum, working with parents, and discipline.

Question: Was any of this training required by the State or your employer?

Response: Yes, it required by the state, but not required by employer.

Question: Was any of this training within the past year?

Response: yes

Question: What was the topic of this training?

Response: "Other"

Question: In what areas would it be useful to receive further training?

Response: Cognitive development, planning curriculum, health and safety

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